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Term:	L27 and reverse osmosis		
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Search History

DATE: Friday, May 19, 2006 [Printable Copy](#) [Create Case](#)

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DB=USPT; PLUR=YES; OP=ADJ



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Term:	L27 and reverse osmosis		
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☐ 1. Document ID: US 6332960 B1

L10: Entry 1 of 2

File: USPT

Dec 25, 2001

US-PAT-NO: 6332960

DOCUMENT-IDENTIFIER: US 6332960 B1

TITLE: Electrostatic fluid purifying device and method of purifying a fluid

DATE-ISSUED: December 25, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Monteith; Robert A.	Barrie			CA

US-CL-CURRENT: [210/748](#); [204/571](#), [204/671](#), [210/243](#), [422/186.04](#)

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KIMC	Draw D
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☐ 2. Document ID: US 5217607 A

L10: Entry 2 of 2

File: USPT

Jun 8, 1993

US-PAT-NO: 5217607

DOCUMENT-IDENTIFIER: US 5217607 A

TITLE: Water decontamination system with filter, electrostatic treatment and UV radiation chamber

DATE-ISSUED: June 8, 1993

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Dalton, III; William E.	South Hadley	MA		
Wegener; Frank	New Castel	CA		

US-CL-CURRENT: [210/143](#); [204/665](#), [210/167](#), [210/169](#), [210/243](#), [210/259](#), [210/290](#), [210/411](#), [422/186.3](#)

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KIMC	Draw D
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vessel same electrostatic field and water filtration	2

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☐ 1. Document ID: US 6795298 B2

L12: Entry 1 of 5

File: USPT

Sep 21, 2004

US-PAT-NO: 6795298

DOCUMENT-IDENTIFIER: US 6795298 B2

TITLE: Fully automatic and energy-efficient deionizer

DATE-ISSUED: September 21, 2004

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Shiue; Lih-Ren	Hsinchu			TW
Sun; Abel	Taipei			TW
Chung; Hsing-Chen	Hsinchu			TW
Hsieh; Fei-Chen	Taichung			TW
Hsieh; Yu-His	Chunghua			TW
Chiu; Ming-Liang	Changhua			TW
Lai; Ying-Jen	Changhua			TW

US-CL-CURRENT: 361/508; 361/528, 361/532

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	K00C	Draw. De
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☐ 2. Document ID: US 6485127 B2

L12: Entry 2 of 5

File: USPT

Nov 26, 2002

US-PAT-NO: 6485127

DOCUMENT-IDENTIFIER: US 6485127 B2

TITLE: Plate-making method, plate-making apparatus, computer-to-cylinder type lithographic printing method and computer-to-cylinder type lithographic printing apparatus

DATE-ISSUED: November 26, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Ohsawa; Sadao	Shizuoka			JP
Nakazawa; Yusuke	Shizuoka			JP

Naniwa; Mutsumi

Shizuoka

JP

US-CL-CURRENT: 347/55

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KMOC	Draw D
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☐ 3. Document ID: US 4954151 A

L12: Entry 3 of 5

File: USPT

Sep 4, 1990

US-PAT-NO: 4954151

DOCUMENT-IDENTIFIER: US 4954151 A

TITLE: Method and means for optimizing batch crystallization for purifying water

DATE-ISSUED: September 4, 1990

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Chang; Chung-Nan	Los Altos	CA		
Conlon; William M.	Palo Alto	CA		
Hendricks; Donald M.	Moraga	CA		

US-CL-CURRENT: 62/532; 62/124

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KMOC	Draw D
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☐ 4. Document ID: US 4386055 A

L12: Entry 4 of 5

File: USPT

May 31, 1983

US-PAT-NO: 4386055

DOCUMENT-IDENTIFIER: US 4386055 A

TITLE: Ozonator with air actuated rotor

DATE-ISSUED: May 31, 1983

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
McBride; Thomas D.	Washington Township, Bergen County	NJ		

US-CL-CURRENT: 422/186.18; 210/760, 422/186.14, 96/94

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KMOC	Draw D
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☐ 5. Document ID: US 4176061 A

L12: Entry 5 of 5

File: USPT

Nov 27, 1979

US-PAT-NO: 4176061

DOCUMENT-IDENTIFIER: US 4176061 A

TITLE: Apparatus and method for treatment of fluid with ozone

DATE-ISSUED: November 27, 1979

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Stopka; Karel	San Francisco	CA	94107	

US-CL-CURRENT: 210/760; 210/127, 210/192, 210/205

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Assignments	Claims	KWIC	Draw. De
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water purifier and electrostatic field

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L15: Entry 1 of 12

File: USPT

Feb 21, 2006

DOCUMENT-IDENTIFIER: US 7001550 B2

TITLE: Charged filtration membranes and uses therefor

PRIOR-PUBLICATION:

DOC-ID

DATE

US 20030178368 A1

September 25, 2003

Brief Summary Text (5):

Protein ultrafiltration is a pressure-driven membrane process used for the concentration or purification of protein solutions (Robert van Reis and Andrew L. Zydney, "Protein Ultrafiltration" in Encyclopedia of Bioprocess Technology: Fermentation, Biocatalysis, and Bioseparation, M. C. Flickinger and S. W. Drew, eds., John Wiley & Sons, Inc. (1999), p. 2197). UF membranes typically have a mean pore size between 10 and 500 Angstroms, which is between the mean pore size of reverse osmosis and microfiltration membranes. Ultrafiltration separates solutes based on differences in the rate of filtration of different components across the membrane in response to a given pressure driving force (R. van Reis and A. L. Zydney, supra, p. 2197). Solute filtration rates, and thus membrane selectivity, are determined by both thermodynamic and hydrodynamic interactions (R. van Reis and A. L. Zydney, supra, p. 2197). Ultrafiltration is frequently used in downstream processing for protein concentration, buffer exchange and desalting, protein purification, virus clearance, and clarification (R. van Reis and A. L. Zydney, supra, p. 2197).

Brief Summary Text (16):

In still another embodiment, the charged compound comprises a linker arm between the charged moiety and the moiety covalently linked to a reactive group of the membrane. The linker arm comprises a portion of the reactive charged compound between a moiety reactive with the membrane and the charged moiety. Alternatively, a linker arm may be added or extended by reacting a membrane with a linker ligand (see Table 1 for non-limiting examples of linker ligands). A linker ligand is compound comprising a first moiety reactive with the membrane (such as a halide for reactivity with a CRC membrane) and a second moiety reactive with a charged reactive compound (such as a hydroxyl moiety reactive with a halide of a charged reactive compound). Where the membrane is a CRC membrane, the linker arm separates the charged moiety and a hydroxyl or primary alcohol group of the cellulosic matrix with which the linker ligand reacts. The linker arm allows the charged moiety to project away from the surface of the membrane. Where the charged compound modifies the surface of a membrane pore, the linker arm allows the compound to project into the lumen of the pore, thereby modifying the size of the pore. Larger membrane pores will be reduced in size, smaller pores are filled, and still smaller pores fail to be penetrated by the compound due to steric hinderance and/or electrostatic repulsion. Consequently, membrane pore size distribution is narrowed, providing improved protein separation.

Description Paragraph (29):

The term "no flow" as used herein refers to the absence of a net flow of solvent and/or charged reactive ligand through pores of a porous filtration or chromatography medium, such as a resin or membrane. Under conditions of no flow,

there is an absence of a sufficient pressure differential between exterior surfaces of the porous medium to cause a net flow of the solvent and/or charged reactive ligand through pores of the porous medium. Where the medium is a membrane exposed to conditions of no flow, there is insufficient pressure differential between the retentate and filtrate sides of a membrane to cause net flow through membrane pores. Insufficient pressure differential is that difference in pressure between the retentate and filtrate sides of a membrane that is too low to cause solvent and/or charged reactive ligand to pass through pores of the membrane such that a net flow fails to occur. Under no flow conditions, solvent and solute may contact all surfaces of the membrane, such as by emersion of the membrane in solvent containing a solute, but due to lack of a net flow through the pores, the solvent and/or charged reactive ligand fail to contact pore surfaces because surface tension at the pore opening, electrostatic repulsion at the pore as derivatization of the exterior membrane surface progresses, or other passive phenomena prevent solvent and/or charged reactive ligand to enter the pores. Where the solute is a reactive ligand compound capable of reacting with functionalities on the surface of the pore, the membrane surface, but not the pore surfaces, becomes derivatized by the charged reactive ligand under no flow conditions. Where the reactive ligand compound comprises a charged moiety, the membrane surface, but not the pore surfaces, gains a net charge under no flow conditions.

Description Paragraph (47):

For example, to test positively charged membranes; permeability is measured in 0.1N NaOH as described herein, above, where permeability is $L_p = J/P$. Following a permeability determination, the Flex Test is performed on a membrane as follows. Each membrane to be tested (net positively charged membranes prepared under active flow versus no flow conditions, or net negative membranes prepared under active flow versus no flow conditions) is placed in a stirred cell and equilibrated with 10 mM Bis Tris buffer (pH=6.5) by passing the buffer through the membrane. The buffer is then discarded and the membrane is tested with positively charged and neutral (uncharged) dextrans to determine sieving characteristics of the positively charged membrane. For example, a useful positively charged dextran is TRITC-DEAE dextran (TdB Consultancy AB, Uppsala, Sweden). The dextrans are introduced onto the retentate side of the membrane. The stirring speed is adjusted to ensure optimum mass transfer characteristics. For example, the filtrate rate is set to 10 LMH using a filtrate pump to minimize membrane fouling and/or concentration polarization. A recirculation time of approximately 15 30 minutes, preferably about 30 minutes, at ambient temperature is used to allow for system equilibration. Filtrate and retentate samples are collected at the end of the 30 minute recirculation period. The TRITC-DEAE solution is then discarded and the membrane is rinsed with 0.1N NaOH by rinsing the membrane and passing the NaOH solution through the membrane pores.

Description Paragraph (66):

Membrane pores are infiltrated by reactive charged compounds under positive pressure when steric factors, such as size and linker arm length, and electrostatic factors, such as charge repulsion, allow it. Thus, according to the invention, membrane pores large enough to allow infiltration of a given reactive charged compound are derivatized by the charged compound such that the size of the pore lumen is reduced. FIG. 3 shows a diagram of a membrane pore having propyl trimethyl ammonium ions covalently attached to the wall of the pore and projecting into the lumen.

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L15: Entry 2 of 12

File: USPT

Sep 6, 2005

DOCUMENT-IDENTIFIER: US 6939719 B2

**** See image for Certificate of Correction ****

TITLE: Equipment of local streaming potential measurement for monitoring the fouling process in hollow-fiber filtrations of nano-colloidal suspension

Abstract Text (1):

The present invention relates to an apparatus for monitoring the progress of membrane fouling that occurs on pores as well as on the surface of a membrane by means of variations of zeta potential (.zeta.) of a hollow-fiber membrane according to time passage of filtration of a suspension, wherein colloid particles, biopolymers and other inorganic particles are dispersed, and the method thereof. Moreover, the present invention also relates to a method to identify the effect of concentration polarization layer and cake layer which can vary according to the axial position of a hollow-fiber and the developing progress of a membrane fouling by measuring the position-dependent zeta potential of the hollow-fiber membrane.

Brief Summary Text (3):

The present invention relates to an apparatus for monitoring the progress of membrane fouling that occurs on pores as well as on the surface of a membrane by means of variations of zeta potential (.zeta.) of a hollow-fiber membrane measured according to time passage of filtration of a suspension, wherein colloid particles, biopolymers and other inorganic particles are dispersed, and the method thereof. Moreover, the present invention also relates to a method to identify the effect of concentration polarization layer and cake layer which can vary according to the axial position of a hollow-fiber and the subsequent developing progress of a membrane fouling by measuring the position-dependent zeta potential of the hollow-fiber membrane.

Brief Summary Text (6):

Zeta potential, being defined based on electrostatic and electrokinetic principles, is known to provide useful real-time information on the surface property and the interaction between membrane and particles in actual operational situations and physicochemical conditions without incurring structural change of membrane or disturbance of flow condition. That is, zeta potential can not only provide information on electrostatic field when the membrane surface is in contact with a flowing solution but can be also an important physical quantity related to a criterion of membrane fouling resulted from adsorption or deposition of particles thus determining the property and performance of a membrane.

Brief Summary Text (11):

Japanese Published Pat. Appln. No. 11-197472 discloses a method to analyze fouling in a given separation membrane as a way to identify the fouling of a reverse osmosis membrane. This method enables to identify the fouling of a flat-plate reverse osmosis membrane by comparing the zeta potentials on membrane surface before and after the fouling and also sets up the washing conditions of the membrane. However, this method is only related to the application of the result of zeta potential to the observation of membrane fouling and is not related to the method or the apparatus of measuring streaming potential. The example 2 of the present invention also shows that the zeta potential changes according to the membrane fouling.

Brief Summary Text (18):

The present invention succeeded in monitoring the progress of membrane fouling over time by evaluating the zeta potential of a hollow-fiber membrane by continuously measuring the streaming potential in two given positions according to time passage of filtration of a given suspension.

Detailed Description Text (3):

The present invention relates to an apparatus and the method of measuring local streaming potential for monitoring the progress of membrane fouling over time in the course of filtration with hollow-fiber membrane.

Detailed Description Text (26):

As mentioned above, the present invention provides a novel apparatus and a novel method to obtain zeta potential influenced by a concentration polarization layer and a cake (or gel) layer which can vary according to the axial position in a given hollow-fiber membrane. The ability to obtain the zeta potential in the present invention in the course of filtration of a given suspension with a hollow-fiber according to time passage can also help to identify the characteristics of physicochemical interactions on membrane pores and on membrane surface as well as to monitor the progress of membrane fouling. These are essential in studying the downstream for the highly efficient filtration with a hollow-fiber membrane. Further, the present invention can also provide critical data that can be used in studying the electrokinetic properties, charged characteristics, hydrophilicity and the level of substituted functional as well as ionic groups according to modifications.

CLAIMS:

1. An apparatus for measuring local streaming potential of a membrane for monitoring the progress of membrane fouling in the course of filtration of a hollow-fiber membrane, wherein said apparatus comprises a feed tank to reserve feed solution in a state of colloidal suspension; a delivery pump to deliver said feed solution through a feed line; a membrane module with a plurality of hollow-fibers through which said feed solution is introduced from said feed line and released through an exit line; at least one electrode installed externally of a hollow-fiber located at the inlet of the membrane module; at least one electrode installed inside the hollow-fiber located at the inlet of the membrane module; at least one electrode installed externally of a hollow-fiber located at the outlet of the membrane module; at least one electrode installed inside the hollow-fiber located at the outlet of the membrane module; a means to measure physical properties of said feed solution being introduced into a membrane module; a pressure meter that measures the transmembrane pressure difference both at the inlet and outlet of a membrane module; a flow-control valve in said exit line used to adjust the transmembrane pressure difference; a means to display and record data obtained from the above-mentioned measuring devices; and a means to calculate the value of zeta potential (.zeta.) of a hollow-fiber membrane.

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L15: Entry 5 of 12

File: USPT

Apr 27, 2004

DOCUMENT-IDENTIFIER: US 6727099 B2

**** See image for Certificate of Correction ****

TITLE: Equipment and method of local streaming potential measurement for monitoring the process of membrane fouling in hollow-fiber membrane filtrations

Abstract Text (1):

The present invention relates to an apparatus for monitoring the progress of membrane fouling that occurs on pores as well as on the surface of a membrane by means of variations of zeta potential (.zeta.) of a hollow-fiber membrane according to time passage of filtration of a suspension, wherein colloid particles, biopolymers and other inorganic particles are dispersed, and the method thereof. Moreover, the present invention also relates to a method to identify the effect of concentration polarization layer and cake layer which can vary according to the axial position of a hollow-fiber and the developing progress of a membrane fouling by measuring the position-dependent zeta potential of the hollow-fiber membrane.

Brief Summary Text (3):

The present invention relates to an apparatus for monitoring the progress of membrane fouling that occurs on pores as well as on the surface of a membrane by means of variations of zeta potential (.zeta.) of a hollow-fiber membrane measured according to time passage of filtration of a suspension, wherein colloid particles, biopolymers and other inorganic particles are dispersed, and the method thereof. Moreover, the present invention also relates to a method to identify the effect of concentration polarization layer and cake layer which can vary according to the axial position of a hollow-fiber and the subsequent developing progress of a membrane fouling by measuring the position-dependent zeta potential of the hollow-fiber membrane.

Brief Summary Text (6):

Zeta potential, being defined based on electrostatic and electrokinetic principles, is known to provide useful real-time information on the surface property and the interaction between membrane and particles in actual operational situations and physicochemical conditions without incurring structural change of membrane or disturbance of flow condition. That is, zeta potential can not only provide information on electrostatic field when the membrane surface is in contact with a flowing solution but can be also an important physical quantity related to a criterion of membrane fouling resulted from adsorption or deposition of particles thus determining the property and performance of a membrane.

Brief Summary Text (11):

Japanese Published Pat. Appln. No. 11-197472 discloses a method to analyze fouling in a given separation membrane as a way to identify the fouling of a reverse osmosis membrane. This method enables to identify the fouling of a flat-plate reverse osmosis membrane by comparing the zeta potentials on membrane surface before and after the fouling and also sets up the washing conditions of the membrane. However, this method is only related to the application of the result of zeta potential to the observation of membrane fouling and is not related to the method or the apparatus of measuring streaming potential. The example 2 of the present invention also shows that the zeta potential changes according to the membrane fouling.

Brief Summary Text (18):

The present invention succeeded in monitoring the progress of membrane fouling over time by evaluating the zeta potential of a hollow-fiber membrane by continuously measuring the streaming potential in two given positions according to time passage of filtration of a given suspension.

Detailed Description Text (2):

The present invention relates to an apparatus and the method of measuring local streaming potential for monitoring the progress of membrane fouling over time in the course of filtration with hollow-fiber membrane.

Detailed Description Text (25):

As mentioned above, the present invention provides a novel apparatus and a novel method to obtain zeta potential influenced by a concentration polarization layer and a cake (or gel) layer which can vary according to the axial position in a given hollow-fiber membrane. The ability to obtain the zeta potential in the present invention in the course of filtration of a given suspension with a hollow-fiber according to time passage can also help to identify the characteristics of physicochemical interactions on membrane pores and on membrane surface as well as to monitor the progress of membrane fouling. These are essential in studying the downstream for the highly efficient filtration with a hollow-fiber membrane. Further, the present invention can also provide critical data that can be used in studying the electrokinetic properties, charged characteristics, hydrophilicity and the level of substituted functional as well as ionic groups according to modifications.

CLAIMS:

1. A method to measure local streaming potential for monitoring the progress of membrane fouling in the course of filtration of a hollow-fiber membrane comprising: introducing a given solution inside a membrane module that contains a hollow-fiber membrane, measuring pressure difference across the membrane pores while measuring conductivity and pH of a given solution, measuring streaming potential difference between an upper and a lower regions of a membrane pore at a given position designated by electrodes which are installed both inside and outside of an inlet and an outlet of the membrane module calculating the value of zeta potential (.zeta.) from the following equation, ##EQU2##

wherein .DELTA.V represents streaming potential difference obtained when a given pressure difference is .DELTA.P; .epsilon. represents dielectric constant; .lambda. represents conductivity of a solution; .eta. represents viscosity of a solution correlating the value of zeta potential (.zeta.) to the progress of the membrane fouling.

2. The method to measure local streaming potential for monitoring the progress of membrane fouling in the course of filtration of a hollow-fiber membrane according to claim 1, wherein said pressure difference across the membrane pores can be adjusted up to 0.3% of the maximum flow rate by using both a pressure gauge and a minute flow-control valve installed on the outlet.

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L20: Entry 1 of 1

File: USPT

Mar 19, 2002

DOCUMENT-IDENTIFIER: US 6357392 B1

**** See image for [Certificate of Correction](#) ****

TITLE: Apparatus and method for raising fish and/or shellfish

Drawing Description Text (5):

FIG. 4 is an electric circuit diagram of a high voltage electrostatic field generator in the breeding apparatus of FIG. 1;

Detailed Description Text (24):

As illustrated in FIG. 2, the electrostatically treated air generator 27 includes a high voltage electrostatic field generator 33. The high voltage electrostatic field generator 33, which is in the shape of box, is carried on a support base 34 positioned near the breeding apparatus 32. The high voltage electrostatic field generator 33 is connected to a power supply, not shown, through a first connection line 35. A generator 36 is carried on the support base 34 and positioned near the high voltage electrostatic field generator 33. The generator 36 is connected to the high voltage electrostatic field generator 33 through a second connection line 37.

Detailed Description Text (25):

A fan 38 is located near the generator 36. Air forced by the fan 38 is delivered to the generator 36 through a first air feed pipe 39. Then, the air within the generator 36 is exposed to an electrostatic field formed by the high voltage electrostatic field generator 33 for performing an electrostatic field treatment.

Detailed Description Text (29):

A high voltage electrostatic field generator 33 constituting the electrostatically treated water producing apparatus 31, which is formed in the shape of box, is carried on a carrier base 60 positioned near the breeding apparatus 32. Then, the high voltage electrostatic field generator 33 is connected to a power supply, not shown, through a first connection line 35.

Detailed Description Text (30):

One end of the second connection line 37 is connected to an electrode 47, which is formed of stainless steel or the like and has the shape of screen, and the other end of the second connection line 37 is connected to the high voltage electrostatic field generator 33. The tank 45 contains activated charcoal 17, water, and the electrode 47. An electrostatic field formed by the high voltage electrostatic field generator 33 is applied to the water. As a result, electrostatically treated water is produced. The activated charcoal 17, in turn, has a deodorizing functions, a purifying functions, an oxidation suppressing functions, and so on, so that the electrostatically treated water in the tank 45 is maintained in a stable and clean state.

Detailed Description Text (31):

Next, an electric circuit of the high voltage electrostatic field generator 33 will be described.

Detailed Description Text (35):

The electrostatic field is a non-varying electrostatic field or a varying electrostatic field generated by the high voltage electrostatic field generator 33. The non-varying electrostatic field is an electric field having a linear waveform generated by a fixed voltage, while the varying electrostatic field is an electrostatic field having an alternating current waveform such as a sinusoidal wave, a rectangular wave, a saw-tooth wave, a multiplexed waveform, or the like. Among these electrostatic fields, an electric field having a multiplexed waveform having high harmonic components is preferred. The electric field having a multiplexed waveform can be produced by an electric circuit using semiconductors or the like, in addition to the aforementioned electric circuit having the high voltage generating transformer 54.

Detailed Description Text (41):

Further, the high voltage electrostatic field generator 33 of the electrostatically treated air generator 37 is operated to generate electrostatically treated air which has undergone the electrostatic field treatment. Then, the electrostatically treated air is supplied from the first aerator 16 into the breeding aquarium 12 through the first air supply pipe 15 at a rate of 8 liters/minute to aerate the breeding seawater in the breeding aquarium 12. Also, since the activated charcoal 17 is located in the breeding aquarium 12, the breeding seawater is maintained in a stable, clean state by the deodorizing action, purifying action, and oxidation suppressing action of the activated charcoal 17. Further, microorganisms inhabiting the activated charcoal 17, such as nitrifying bacteria, decompose excretion and so on in the breeding seawater. Since approximately one liter of water evaporates per day, electrostatically treated replacement water is added.

CLAIMS:

9. The breeding apparatus according to claim 1, further comprising a filter for filtering the water in the aquarium.

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Search Results - Record(s) 1 through 1 of 1 returned.

☐ 1. Document ID: US 6357392 B1

L20: Entry 1 of 1

File: USPT

Mar 19, 2002

US-PAT-NO: 6357392

DOCUMENT-IDENTIFIER: US 6357392 B1

**** See image for Certificate of Correction ****

TITLE: Apparatus and method for raising fish and/or shellfish

DATE-ISSUED: March 19, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Ido; Katsutomi	Gifu-ken			JP

US-CL-CURRENT: 119/252; 119/248, 119/260

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC	Draw. D
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Terms	Documents
L17 and filtering water	1

Display Format: [CIT](#)

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Search Results - Record(s) 1 through 1 of 1 returned.

☐ 1. Document ID: US 7015254 B2

L28: Entry 1 of 1

File: USPT

Mar 21, 2006

US-PAT-NO: 7015254

DOCUMENT-IDENTIFIER: US 7015254 B2

TITLE: Description of an inorganic polymer "electret "in a colloidal state along with the method of generating and applications

DATE-ISSUED: March 21, 2006

PRIOR-PUBLICATION:

DOC-ID

DATE

US 20010027219 A1

October 4, 2001

INVENTOR-INFORMATION:

NAME

CITY

STATE

ZIP CODE

COUNTRY

Holcomb; Robert R.

Nashville

TN

37212

US

US-CL-CURRENT: [516/82](#); [252/179](#), [252/184](#), [264/436](#), [307/400](#), [516/100](#), [516/83](#)

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC	Draw Data
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Terms	Documents
L27 and reverse osmosis	1

Display Format: [CIT](#)

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US-PAT-NO: 5139675

DOCUMENT-IDENTIFIER: US 5139675 A

TITLE: Filtration cleaning system

DATE-ISSUED: August 18, 1992

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Arnold; Edward R.	Selmer	TN	38375	N/A
Ginn; H. Earl	Nashville	TN	37215	N/A

APPL-NO: 07/564790

DATE FILED: August 8, 1990

INT-CL-ISSUED: [05] B01D035/06 , B01D061/26

INT-CL-CURRENT:

TYPE	IPC	DATE
CIPS	C02F1/48	20060101
CIPS	A61L2/18	20060101
CIPS	B01D65/00	20060101
CIPS	B01D65/06	20060101
CIPS	B01D65/02	20060101

US-CL-ISSUED: 210/636 , 210/646 , 210/748 , 210/797 , 210/243 , 210/257.1
, 210/257.2 , 210/409 , 134/1 , 204/149 , 204/186 , 422/22

US-CL-CURRENT: 210/636, 134/1 , 204/240 , 204/554 , 205/701 , 205/751
, 210/243 , 210/257.1 , 210/257.2 , 210/409 , 210/646
, 210/748 , 210/797 , 422/22

FIELD-OF-CLASSIFICATION-SEARCH: 210/636; 210/645 ; 210/646 ; 210/695
; 210/748 ; 210/791 ; 210/222 ; 210/223
; 210/243 ; 210/257.2 ; 210/407 ; 210/409
; 210/257.1 ; 210/797 ; 134/1 ; 204/149

; 204/186 ; 422/22 ; 604/4 ; 604/5 ; 604/6

****See application file for complete search history****

REF-CITED:

U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>1773275</u>	August 1930	Neeley	210/223
N/A			N/A
<u>2596743</u>	May 1952	Vermeiren	210/222
N/A			N/A
<u>3511776</u>	May 1970	Avampato	210/695
N/A			N/A
<u>3625884</u>	December 1971	Waltrip	210/152
N/A			N/A
<u>4288323</u>	September 1981	Brigante	210/222
N/A			N/A
<u>4365975</u>	December 1982	Williams et al.	48/197R
N/A	N/A		
<u>4367143</u>	January 1983	Carpenter	210/222
N/A			N/A
<u>4407719</u>	October 1983	Van Gorp	210/695
N/A			N/A
<u>4473449</u>	September 1984	Michaels et al.	210/748
N/A			N/A
<u>4545887</u>	October 1985	Arneson et al.	204/280
N/A			N/A
<u>4582629</u>	April 1986	Wolf	210/748
N/A			N/A
<u>4659479</u>	April 1987	Stickler et al.	210/695
N/A			N/A
<u>4746425</u>	May 1988	Stickler et al.	210/695
N/A			N/A
<u>4865747</u>	September 1989	Larson et al.	210/695
N/A			N/A
<u>4865748</u>	September 1989	Morse	210/748
N/A			N/A
<u>4888113</u>	December 1989	Holcomb	210/222
N/A			N/A

FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	US-CL
-----------------------	------------------	----------------	--------------

463844	August 1928	DE2
417501	September 1934	GB

OTHER PUBLICATIONS

Aquabel, Brochure--date unknown.

The Ion Stick, Brochure, York Energy Conservation--date unknown.

ART-UNIT: 136

PRIMARY-EXAMINER: Jones; W. Gary

ABSTRACT:

A dialyzer reprocessing device and method are disclosed. The device and method are of the type which include a dialyzer and means for cleaning the dialyzer by treatment with fluids. Included is a treating device for modifying the fluids prior to introduction into the dialyzer. The treating device includes means for directly injecting into the fluids electromagnetic radiation having a preselected frequency through a nonelectrically insulated conductor.

16 Claims, 4 Drawing figures

Exemplary Claim Number: 1,12,13

Number of Drawing Sheets: 3

----- KWIC -----

Brief Summary Text - BSTX (2):

This invention relates generally to filtration and membrane technology and, in particular, to enhancing the lifetime of utility of filtration devices.

Brief Summary Text - BSTX (4):

Many industrial and scientific operations today depend upon filtration to separate valuable, nutrient or metabolic substances from waste or otherwise unusable products. These operations include direct osmosis, reverse osmosis and ultrafiltration methods; all involve passage of fluids over semipermeable membranes which allow the fluid to be separated from small dissolved molecules colloids, and suspended solids. Membrane-retained components are collectively

called the concentrate or retentate. Materials permeating the **membrane** are called the filtrate or permeate.

Brief Summary Text - BSTX (5):

Direct or natural **osmosis** utilizes a semipermeable **membrane** flanked on one side by a concentrated solute solution and on the other by a less concentrated solution. Osmotic forces will tend to equalize the solute concentration by passing water or other solvent through the **membrane**, while the solute cannot permeate the **membrane**. In **reverse osmosis**, application of pressure to the concentrated solution will force pure water or solvent back through the **membrane**, thereby concentrating the solute. In ultrafiltration, on the other hand, pressure is applied to a solution to force the solvent through the semipermeable **membrane**. That is, ultrafiltration is pressure-driven osmotic filtration on a molecular scale.

Brief Summary Text - BSTX (6):

In addition to purely osmotic **membranes** which involve passage of solvent in one direction or the other, dialyzing **membranes** permit small solute molecules and ions to permeate the **membranes**. Dialysis basically is a **membrane** transport system in which solute molecules are exchanged between two liquids. For example, globular proteins in solution can easily be separated from low-molecular weight solutes utilizing a semipermeable **membrane** to retain protein molecules yet allow small solute molecules and water to pass through.

Brief Summary Text - BSTX (8):

In an artificial kidney, blood flows continually between **membrane** surfaces (the blood compartment); on the other side of the **membrane** is the dialyzing fluid (the dialysate compartment). The **membrane** is porous enough to allow all constituents of the plasma except plasma proteins to diffuse freely in both directions--from plasma into the dialyzing fluid and from the dialyzing fluid back into the plasma. If the concentration of a substance is greater in the plasma than in the dialyzing fluid, there will be a net transfer of the substance from the plasma into the dialyzing fluid. The amount of the substance that transfers depends on: (1) the difference between the concentrations on the two sides of the **membrane**; (2) molecular size, the smaller molecules diffusing more rapidly than larger ones; and (3) the length of time that the blood and fluid remain in contact with the **membrane**.

Brief Summary Text - BSTX (9):

Types of dialyzers include: (1) coil, which incorporates a **membrane** in the form of a flattened tube wound around a central, rigid cylinder core, with a supporting mesh between adjacent portions of the **membranes**; (2) parallel plate,

which incorporates a membrane in tubular or sheet form supported by plates in a sandwiched configuration; and (3) hollow-fiber, which incorporates the membrane in the form of very small fibers having a microscopic channel running through them. Most sheet and hollow-fiber membranes are cellulosic, although other materials have also been prepared and evaluated.

Brief Summary Text - BSTX (10):

Probably the most important technical innovation in dialysis technology in support of hemodialysis is the development of hollow-fiber dialysis membranes and devices. One known dialyzer configuration is a capillary flow dialyzer, comprised of multiple hollow-fiber membranes contained within a housing. The hollow-fiber membranes are cylindrical capillaries having a diameter of less than 1 .mu.m, and whose walls function as the semipermeable membrane, permitting selective exchange of materials across the walls.

Brief Summary Text - BSTX (13):

The rinsed and cleaned dialyzer must also be treated by a process that prevents adverse effects due to microbial contamination. Typically, the blood compartment of the dialyzer is sterilized or subjected to high level disinfection. In practice, the dialysate compartment is also subjected to the same process because germicides pass through the membrane of the device. Typically, formaldehyde is used as the germicide, although other chemical germicides may be used which are shown not to damage the integrity of the dialyzer and must rinse out of the dialyzer to below known toxic levels with a rinse-out period established for the particular germicide. Care must also be taken not to mix reactive materials such as sodium hypochlorite and formaldehyde.

Brief Summary Text - BSTX (15):

Treatment of water to improve its properties for a variety of industrial and residential applications has been widely discussed in the scientific literature and in patents issued in the United States and other countries. The variety of devices for such treatment is so great that a comprehensive review thereof will not be undertaken here, it being generally known that such systems have been proposed based on technologies including static and dynamic magnetic treatment, treatment using electrostatic fields, ultrasound, externally-generated heating radiation (such as microwave), directly injected electromagnetic radiation, and, of course, a variety of chemical treatment techniques.

Brief Summary Text - BSTX (16):

The scientific basis for the effects of various water treatment techniques has been widely debated and discussed, and opinions in the scientific community

vary dramatically about the potential for such treatment techniques on an industrial or commercial scale. For example, in the Soviet Union, magnetic treatment of water to assist in removal or prevention of scale has been reported. Favorable analysis of such treatment has been criticized by literature generated in the United States. Some of the theories discussed include one which advocates the hypothesis that magnetic treatment decreases the surface tension of the water molecules, thereby making the treated water "wetter" than untreated water. Another advocates the belief that the magnetic fields generated within the water act only on the impurities contained within the water. Others related to ionic charge theory, minor changes in pH, changes in the zeta potential or the like.

Brief Summary Text - BSTX (21):

A permanent magnet system is described in Mitchell, U.S. Pat. No. 4,808,306 issued Feb. 28, 1989 for "Apparatus for Magnetically Treating Fluids". A field generator is mounted on one side of a pipe, through which fluid to be treated passes, in a non-ferromagnetic housing. A magnet is embedded in the housing and has an odd number of sections of alternating polarity. For fuel treatment, the uppermost section is desirably a south polar magnetic field. If water is to be treated, a north ferromagnetic plate mounted adjacent to but outwardly from the pipe is used for increasing magnetic field strength. Mitchell indicates that his device can lead to fuel consumption savings, to maintain minerals and other contaminants of water in solution (softening of water), prevention of scale and rust and to improve the taste, cleaning and solvent properties of water.

Brief Summary Text - BSTX (23):

A unique magnet arrangement for water treatment is disclosed in U.S. Pat. No. 4,888,113 issued to Holcomb on Dec. 19, 1989 for "Magnetic Water Treatment Device". In this patent, Holcomb discusses the use of a plurality of rectangular magnets attached to the exterior of a pipe. The magnets are arranged in pairs adjacent the pipe such that the positive pole of one pair is oriented to one end of a support housing and the negative pole is oriented toward the other end of the housing. Another similarly constructed housing is secured to the opposite side of the pipe, the second housing also from those in the first housing. Thus the positive pole of the first set faces the negative pole of the second set to cause an "attractive" mode of magnetic flux treatment. Applications such as scale prevention, as well as use in washing machines, swimming pools, ice rinks, livestock watering, and coffee brewing are suggested. The patent also suggests that the taste of treated water is superior to that of untreated water. The patent further mentions that the magnetic force fields can be generated through wound iron coils coupled to a DC

generator.

Brief Summary Text - BSTX (24):

Another water treatment technique is that disclosed in U.S. Pat. No. 4,865,748 issued Sep. 12, 1989 to D. Morse and entitled "Method and System for Variable Frequency Electromagnetic Water Treatment". In this device, a non-insulated conductor in direct contact with a fluid to be treated is coupled to a **generator** of electromagnetic radiation, preferably in the radio frequency range. According to the patent, the radiation is injected at a frequency which is related to the electromagnetic radiation absorption or emission profile of the particular system being treated. This patent also focuses on the use of that system for the elimination and prevention of scale build-up in boiler systems and the like.

Brief Summary Text - BSTX (28):

In an illustrated embodiment, reuse of hemodialyzers is enhanced by employing a treating device for modifying the reprocessing fluids in a dialyzer reprocessing device prior to their introduction into the dialyzer; the treating device includes an electromagnetic treatment device for directly injecting into the fluids electromagnetic radiation having a preselected frequency through a non-electrically insulated conductor. The electromagnetic treatment device includes an electromagnetic frequency **generator** for generating an electromagnetic signal having electric and magnetic components electrically coupled with at least one non-electrically insulated conductive probe which is in contact with the fluids. Preferably, the treating device includes a pair of conductive probes spaced apart from one another within a conduit for conveying the fluids to the dialyzer.

Detailed Description Text - DETX (3):

Reference is initially made to FIG. 1 depicting a treating device 20 according to the present invention. Treating device 20 includes at least one conductive probe 22, and preferably a second probe 23, spaced apart from probe 22, typically about 5.5 in. apart. Probes 22 and 23 are mounted such a way that the tips 24 and 25 of the probes 22 and 23 are in direct contact with fluids that flow through a conduit 26. The probe is mounted in the conduit so that water is treated while flowing through conduit prior to entry into the filter or dialyzer to be cleaned or reprocessed. An electromagnetic wave **generator** 28 is coupled to a coaxial wire 30 which is in turn connected to the external connectors 32 and 33 of the probes 22 and 23, respectively, so that electromagnetic radiation consisting of magnetic and electrical wave components is provided to tips 24 and 25. The two probe arrangement serves to direct or focus the electric and magnetic fields of the electromagnetic radiation.

Conduit 26 where probes 22 and 23 are located is secured to, for example, a wooden dowel 27 to maintain linearity of the conduit. Connectors 29 and 31 are suitably polypropylene tee-type connectors or other suitable autoclavable material.

Detailed Description Text - DETX (5):

In a preferred embodiment, the **generator** 28 employed for the direct injection of electromagnetic radiation operates at about 40 volts (peak to peak) with 425 milliamps current. The frequency of the radiation generated is in the range of 1 kHz to 1000 MHz. It has been found that a frequency, preferably, in the range of about 20 to 60 MHz is useful in treating water and aqueous solutions. The length of time for injection of the electromagnetic radiation can be varied widely, as can the location of the probes. As explained below, the probes in a hemodialyzer reprocessing system are preferably located where all fluids entering the dialyzer will undergo electromagnetic treatment.

Detailed Description Text - DETX (10):

The comparative testing was performed over a ten-month period from Sep. 1, 1989 to Jun. 30, 1990. The dialyzers used were Hemaflow F60 and Hemaflow F80, both manufactured by Fresenius AG, Oberursel, West Germany, and Clirans TAF 175, manufactured by Terumo **Corporation**, Tokyo, Japan, for both the controls and treated dialyzers.

Detailed Description Text - DETX (17):

In any system which involves interaction of a **membrane** with fluids and transport of substances across the **membrane**, the lifetime of utility of the filtration device is dependent upon many variables, such as the **membrane** material, the feed fluids used, and general operating conditions. These factors ultimately affect the structural integrity and performance of the **membrane**. Studies comparing dialyzers reprocessed in accordance with the present invention and those subjected to conventional cleaning demonstrate dramatically improved lifetimes for the dialyzers. In fact, any system involving filtering or cleaning of a filtration device is benefitted by fluid treatment in accordance with the present invention to increase lifetime utility of the device.

Claims Text - CLTX (7):

7. The device of claim 1, wherein said treating device includes an electromagnetic frequency **generator** coupled to the conductor.

Claims Text - CLTX (15):

filter means containing at least one filtration membrane module, said filter means including inlet means, first outlet means for concentrate and second outlet means for permeate;

Claims Text - CLTX (35):

15. The device of claim 13, wherein said treatment means includes an electromagnetic frequency generator coupled with at least one non-electrically insulated conductor in contact with said fluids.

US-PAT-NO: 6338820

DOCUMENT-IDENTIFIER: US 6338820 B1

TITLE: Apparatus for performing assays at reaction sites

DATE-ISSUED: January 15, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Hubbard; Allyn	Medfield	MA	N/A	N/A
Kale; Samesh	Allston	MA	N/A	N/A
Rollins; Scott A.	Oxford	CT	N/A	N/A
Springhorn; Jeremy P.	Guilford	CT	N/A	N/A
Squinto; Stephen P.	Bethany	CT	N/A	N/A

ASSIGNEE INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE
Alexion Pharmaceuticals, Inc.	Cheshire	CT	N/A	N/A	02

APPL-NO: 09/134141

DATE FILED: August 14, 1998

PARENT-CASE:

This Application claim benefit to provisional Application No. 60/055,792
Aug. 15, 1997.

INT-CL-ISSUED: [07] G01N035/00 , G01N035/10

INT-CL-CURRENT:

TYPE	IPC	DATE
CIPS	B01J19/00	20060101
CIPS	G01N35/00	20060101
CIPN	G01N35/10	20060101

US-CL-ISSUED: 422/64 , 422/63 , 422/65 , 422/67 , 422/72 , 422/100
, 436/43 , 436/45 , 436/50 , 436/164 , 436/165 , 436/180

US-CL-CURRENT: 422/64, 422/100 , 422/63 , 422/65 , 422/67 , 422/72 , 436/164
, 436/165 , 436/180 , 436/43 , 436/45 , 436/50

FIELD-OF-CLASSIFICATION-SEARCH: 422/63; 422/65 ; 422/64 ; 422/67 ; 422/72
; 422/100 ; 436/43 ; 436/45 ; 436/50
; 436/164 ; 436/165 ; 436/180 ; 435/287.2
; 435/288.4 ; 435/288.5

****See application file for complete search history****

REF-CITED:

U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>3679367</u>	July 1972	Negersmith et al.	N/A
N/A			
<u>4258647</u>	March 1981	Pohl et al.	N/A
N/A			
<u>4279862</u>	July 1981	Bretaudiere et al.	N/A
N/A			
<u>4381291</u>	April 1983	Ekins	N/A
N/A			
<u>4495149</u>	January 1985	Iwata et al.	N/A
N/A			
<u>4515889</u>	May 1985	Klose et al.	N/A
N/A			
<u>4676952</u>	June 1987	Edelmann et al.	N/A
N/A			
<u>4745072</u>	May 1988	Ekins et al.	N/A
N/A			
<u>4940527</u>	July 1990	Kazlauskas et al.	N/A
N/A			
<u>5006749</u>	April 1991	White	N/A
N/A			
<u>5160702</u>	November 1992	Kopf-Sill et al.	N/A
N/A			
<u>5171533</u>	December 1992	Fine et al.	422/72
N/A			
<u>5171695</u>	December 1992	Ekins	N/A

N/A				
<u>5173262</u>	December 1992	Burtis et al.	N/A	N/A
N/A				
<u>5242803</u>	September 1993	Burtis et al.	N/A	N/A
N/A				
<u>5252294</u>	October 1993	Kroy et al.	N/A	N/A
N/A				
<u>5304487</u>	April 1994	Wilding et al.	N/A	N/A
N/A				
<u>5368704</u>	November 1994	Madou et al.	N/A	N/A
N/A				
<u>5409665</u>	April 1995	Burd	N/A	N/A
N/A				
<u>5413732</u>	May 1995	Buhl et al.	N/A	N/A
N/A				
<u>5449621</u>	September 1995	Klein	436/45	N/A
N/A				
<u>5472603</u>	December 1995	Schembri	N/A	N/A
N/A				
<u>5532128</u>	July 1996	Eggers et al.	N/A	N/A
N/A				
<u>5599502</u>	February 1997	Miyazaki et al.	422/82.01	N/A
N/A				
<u>5627041</u>	May 1997	Shartle	N/A	N/A
N/A				
<u>5639428</u>	June 1997	Cottingham	422/112	N/A
N/A				
<u>5935785</u>	August 1999	Reber et al.	435/6	N/A
N/A				
<u>6013513</u>	January 2000	Reber et al.	435/288.5	N/A
N/A				

FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	US-CL
0305210	March 1989	EP	
0322657	May 1989	EP	
0410645	January 1991	EP	
0417305	March 1991	EP	
0523522	January 1993	EP	
0616218	September 1994	EP	
3245049	October 1991	JP	
9322058	November 1993	WO	

9631782 October 1996 WO
9721090 June 1997 WO

OTHER PUBLICATIONS

John A. Wright, et al., Towards a Functional Mems Neurowell by Physiological Experimentation, DSC--vol. 59, Microelectromechanical Systems (MEMS) ASME (1996).

Carol T. Schembri, et al., Portable Simultaneous Multiple Analyte Whole-Blood Analyzer for Point-of-Care Testing, Clinical Chemistry 1665-1670, vol. 38, No. 9 (1992).

European Search Report mailed Dec. 12, 1998.

Philippe Arquint et al., Micromachined Analyzers on a Silicon Chip, Clinical Chemistry, 1805-1809, vol. 40, No. 9 (1994).

Gary Whomas and Wil Ophey, Optical Recording, Physics World, 36-41 (1990).

Schematic Drawing, Sony KSS36361A Optical Pickup Organization (Date Unknown).

Beth Burkstrand, Breakthrough Reported on Gene-Reading 'Biochip', E03 (Jun. 30, 1998) <<http://www.washingtonpost.com/wp-srv/WPlate/1998-06/30/0981-063098-idx.html>>.

Motorola, Packard to Make 'Biochips' (Jun. 29, 1998) <<http://washingtonpost.com/wp-srv/digest/tech2.htm>>.

Introducing the BioChip Arrayer.TM. (May 15, 1998) <<http://www.packardinst.com/pr/pr598-1.htm>>.

Motorola, Packard Instrument Co. and Argonne to Develop Advanced Biochip Technology (Jun. 29, 1998) <<http://www.packardinst.com/pr/pr698-3.htm>>.

New Advanced Tools to Decode the Human Genome Introduced by Packard Instrument Company (Jun. 29, 1998) <<http://www.packardinst.com/pr/pr698-4.htm>>.

ART-UNIT: 1743

PRIMARY-EXAMINER: Warden; Jill

ASSISTANT-EXAMINER: Bex; Kathryn

ATTY-AGENT-FIRM: Mintz, Levin, Cohn, Ferris, Glovsky & Popeo, P.C. Elrifi;
Ivor R. Hopkins; Brian P.

ABSTRACT:

An apparatus for performing a assays includes an axially rotatable substrate including a plurality of layers of a semiconductor material and numerous radially-arrayed reaction sites. The apparatus further includes a rotary stepper motor which rotates the substrate at an adjustable and substantially continuous speed and controls the rotation of the substrate by adjusting the speed and a direction of rotation. In addition, the apparatus includes a dual function head which has a fluid dispenser that has a fluid dispenser outlet and delivers a fluid to a reaction site and also has a readout device that has a sensor which receives an identifying signal from the reaction site on the substrate or scans the substrate to read identifying marks at the reaction site. Moreover, the apparatus may be aligned by a computer having a memory for storing a start location for the dispenser outlet on the substrate and additional electronics. The computer provides movement signals to the rotary stepper motor and a linear stepper motor on which the dispenser outlet is mounted, whereby the motors align the dual function head over the substrate, such that the dispenser outlet is aligned over the reaction site.

52 Claims, 24 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 20

----- KWIC -----

Brief Summary Text - BSTX (9):

A second category of miniaturization apparatus employs silicon in some functional, e.g., electrical or mechanical, modality as the substrate, and chemicals then are tested on the substrate. In some cases, micro-robotics or micro-chemistry, or both, may be employed with such substrates. For example, Orchid's chip may employ microfluidic pumps, e.g., electronic pumps having no moving parts, to move substances between sites. Nanogen, Inc. also has

developed a microelectronic device for handling low-dilutions of charged molecules. However, unlike Orchid, which may use electrokinetic pressure pumping, the Nanogen device employs electrophoresis as a motive agent to analyze chemical reactions acting over the surface of the silicon substrate at about twenty-five reaction sites. Electrokinetic pressure pumping has been described as a combination of electrophoresis and electro-osmosis.

Brief Summary Text - BSTX (20):

The invention is an apparatus for performing a plurality of assays, such as a plurality of chemical assays or a plurality of biochemical reactions comprising an axially rotatable substrate including a plurality of radially-arrayed reaction sites. Other assays include cellular assays as well as physical and biophysical assays, e.g., chemiluminescence luminescence, dielectric field strength, resistivity, impedance, circular dichroism, refractivity, surface plasmon resonance, optical absorbance, magnetic resonance, and the like. Assay components may include, for example, synthetic organic compounds (e.g., compounds of less than 100,000 molecular weight, preferably compounds of less than 10,000 molecular weight, more preferably compounds of less than 1,000 molecular weight) proteins (e.g., enzymes, amyloid proteins, receptors, cytokines, and antibodies) peptides, oligopeptides, nucleic acids (including modified synthetic derivatives thereof, DNA, RNA oligonucleotide and monomeric nucleotides, nucleosides, modified synthetic variants thereof, and the like) cells (e.g., bacterial cells; yeast or other fungal cells; unicellular organisms such as protozoans; animal cells including insect, avian, and mammalian cells; and plant cells) cell membranes and other cellular components, buffers, salts, ions such as metal ions, lipids, carbohydrates, vitamins, extracellular matrixes or components thereof, as well as blood serum, or other bodily fluids.

Brief Summary Text - BSTX (27):

The dispenser outlet(s) may be movably mounted on a rail which transects the substrate and is oriented substantially parallel to a surface of the substrate, e.g., is suspended over the substrate, and a first motor may be used to rotate the substrate. The means for aligning comprises a second motor for positioning the at least one fluid dispenser outlet along the rail. Moreover, as noted above, the first motor may be a rotary stepper motor, and the second motor may be a linear stepper motor. In addition, the means for aligning may comprise a computer (including a microprocessor or other electronic device) which receives, processes, and presents data, and which stores a start location on the substrate's surface for the dispenser outlet. The computer and additional, functionally linked electronics including, for example, a signal generator such as an electromagnetic energy source, and a calibrating sensor, such as an

electromagnetic energy sensor, may provide movement signals to the first and second motor. Thus, the computer and the additional electronics generate signals to align the dispenser outlet over the reaction site. Alternatively, the fluid dispenser outlet(s) may be mounted on a pivotable arm which may be rotated through an arc across the surface of, e.g., over, the rotating substrate. In this embodiment, the second motor may also be a rotary stepper motor.

Drawing Description Text - DRTX (14):

FIG. 12A is a graph of the forward laser size scanning of a droplet of Rhodamine 610 solution deposited on a silicon substrate, and FIG. 12B is a graph of the reverse laser size scanning of a droplet of Rhodamine 610 solution deposited on a silicon substrate;

Detailed Description Text - DETX (2):

Referring to FIG. 1, a perspective view of a first embodiment of the apparatus of the present invention is depicted. An apparatus 1 for delivering fluid to a reaction site includes a substrate 10, such as a silicon wafer, mounted on a platform 12, which includes a rotary stepper motor (not shown), such as a Zeta 57-51-10 Motor and a Zeta 4 Rotary Driver manufactured by Parker Compumotor Company of Rohnert Park, Calif., U.S.A. The rotary stepper motor rotates substrate 10 in the directions of arrow A. A rail 14 is suspended above and transects, e.g., bisects, substrate 10. A linear stepper motor 16, such as a L20 Stepper Motor, manufactured by Parker Compumotor Company of Rohnert Park, Calif., U.S.A., is mounted on rail 14, such that linear stepper motor 16 is movable in one dimension in the directions of arrow B along rail 14 over the surface of substrate 10.

Detailed Description Text - DETX (17):

Alternatively, the fluid dispenser may employ ink-jet technology to provide measured amounts of aliquot(s) to reaction sites on the substrate surface. In another embodiment, a fluid dispenser may eject a micro-droplet stream of the at least one fluid from the dispenser outlet, and an electrostatic accelerator and deflector may direct the micro-droplet stream to at least one of the reaction sites. Moreover, a fluid dispenser may include a micro-fluidic device employing an oscillating solenoid for pumping fluid from a capillary tube or a piezoelectric device having a piezoelectric tube to dispense measured aliquots separated by air from a capillary tube, or the like. Because the aliquots are separated by air, excessive dilution of the aliquots is avoided.

Detailed Description Text - DETX (18):

Such devices also may include the BioJet Quanti3000.TM. fluid dispenser,

which is manufactured by BioDot, Inc. of Irvin, Calif., U.S.A. This device employs an inkdot-type fluid delivery system. This device may achieve flow rates up to 50 .mu.l/sec. of a fluid having a viscosity in a range of 1 to 20 centipoise. This range of flow rates, however, may be extended dependent on fluid rheology. Moreover, this device may deliver lines of fluid with volumes as low as 250 nl/cm and line widths in a range of 0.25 to 5 mm. The specifications were determined by dispensing deionized water with 0.5% surfactant added. This device also may deliver droplets of fluid with volumes as low as 4 nl/droplet and droplet diameters in a range of 0.25 to 5 mm. Achievable droplet volumes and diameters are dependent upon fluid and fluid membrane characteristics. BioJet Quanti3000.TM. fluid dispenser may achieve a flow repeatability of less than 1% cumulative volume variations for delivered lines and of less than 5% variation between drops.

Detailed Description Text - DETX (20):

FIG. 3 depicts a perspective view of a second embodiment of the apparatus of the present invention. An apparatus 3 for delivering fluid to a reaction site includes substrate 10, such as a silicon wafer, mounted on platform 12, which includes a first rotary stepper motor (not shown), such as a Zeta 57-51-10 Motor and a Zeta 4 Rotary Driver. The first rotary stepper motor rotates substrate 10 in the directions of arrow A. A second rotary stepper motor 30, such as a Zeta 57-51-10 Motor or a Zeta 4 Rotary Driver, is mounted on platform 12, and a pivot arm 32 is mounted on second rotary stepper motor 30. A fluid dispenser 34 is mounted on pivot arm 32, and pivot arm 32 is of sufficiently length, such that fluid dispenser 34 may be rotated through an arc in two dimensions by the rotation of second rotary stepper motor 30 in the directions of arrow C to reach the entire surface of rotating substrate 10.

Detailed Description Text - DETX (35):

The readout device 5 may be combined with a tracking system, such as in a (Compact Disc) CD pickup head, e.g., Sony KSS361A Optical Pickup manufactured by Sony Corporation of Tokyo, Japan, or the readout device 5 may be physically separate from the tracking system. In known optical pickup heads, such as those found in CD players, light emitted from a laser is split into three beams, i.e., a central and two flanking beams, and is directed onto the surface of the CD via a turning mirror and a lens. The central beam impinges upon the CD surface in order to read the binary coded information and to provide a feedback signal for focusing the central beam on the CD surface while the two flanking beams provide feedback signals for tracking the pickup head over the CD surface. The light reflected from the CD surface is received through the lens, is deflected by the turning mirror through the beam splitter, and impinges upon a photodiode array. Feedback signals then are generated by

virtue of the geometry of the photodiode array. The operation of such feedback control systems is described in more detail in G. Thomas and W. Ophey, "Optical Recording," PHYSICS WORLD, 36-41 (December 1990), the disclosure of which is incorporated herein by reference.

Detailed Description Text - DETX (53):

Generally, chemically sensitive gates and ion sensitive gates are transistors whose gates have been replaced with by an ion selective permeable **membrane**. Chemically and ion sensitive gates may be used to detect changes in pH as well as changes in chemical and ion composition. Further, substrate 10 may include interdigitated arrays (IDAs). An IDA may comprise two arrays of rectangular electrodes that are placed so that the arrays intermesh, but do not contact each other. Chemical reactions occurring between the arrays and generating electrical charges causes a resultant current to flow in the arrays. The resultant current flow may be monitored to indirectly monitor the progress of chemical reactions at the reaction site. Electro-mechanical elements 93 may produce a vibration at the reaction site to stir or mix a plurality of substances to facilitate or accelerate chemical or biochemical interactions.

Detailed Description Text - DETX (54):

In addition, substrate 10 may include elements, e.g., electrodes, that actively alter the **electrostatic** charge on substrate 10 in local areas. Such an **electrostatic** charge may attract or repel microvolumes of fluid. Consequently, such electrodes may be used to aid in delivering precise amounts of the at least one fluid to the at least one reaction site. With a plurality of controlled electrodes, an **electrostatic** field consisting of "hills" and "valleys" may be generated across the entire surface of substrate 10, thus, creating a plurality of "virtual" reaction sites. Generally, these **electrostatic** fields may be used to create vertical and horizontal containment fields. These virtual reaction sites may reduce cross-contamination between sites. The surface charge also may be manipulated by coating or depositing a material having a desired charge onto the surface of substrate 10. This technique may be used in conjunction with the elements described above.

Detailed Description Text - DETX (65):

The following tests were conducted using samples consisting of Rhodamine 610 perchlorate dissolved in butanol at a concentration of about 2E-4 molar (hereinafter "Rhodamine solution"). Referring to the apparatus as depicted in FIGS. 5 and 6, a green He-Ne laser, lasing at about 543.5 nm, was used to transmit light along a first portion of a bifurcated optical fiber, e.g., optical fiber 53. The common end of this bifurcated fiber was oriented orthogonally to a silicon wafer (the substrate) mounted on a rotary chuck, such

as rotary chuck 110 depicted in FIG. 5. The bifurcated optical fiber allows about 53 microwatts of laser light to impinge upon droplets of Rhodamine solution dispensed by a BioJet Quanti3000.TM. fluid dispenser. The portion of the laser light reflected from the substrate surface is gathered via the common end of the bifurcated fiber and transmitted along a second portion of the bifurcated optical fiber. The signal received by the second portion of the fiber is passed through a high pass filter in order to remove noise and feedback associated with the laser, at a cutoff wavelength of about 565 nm This filtered signal was then transmitted to a photomultiplier tube, (PMT) e.g., a Hamamatsu PMT, Model No. 5784-01, manufactured by Hamamatsu Corporation, of Bridgewater, N.J., U.S.A., for analysis.

Detailed Description Text - DETX (73):

There was a distinct asymmetry in the forward scan intensity curve. Referring to FIG. 12B, the reverse scan intensity curve indicated that the source of hysteresis was the droplet itself The reverse intensity profile was a mirror image of the forward intensity profile. This suggested that the droplet sitting on the silicon wafer was "pushed" slightly to the right. The cause of this offset may be due to the fluid dynamics of the fluid dispenser, electrostatic effects, or a combination thereof. Moreover, the about one half-volt of signal lost on the reverse intensity curve was due to the evaporation of the droplet during testing.

Detailed Description Text - DETX (82):

Referring to FIG. 15, an second example describing the interface of the components of an embodiment of the apparatus having a multi-function head, is described. In this embodiment, overall control of the operation of the apparatus may be performed by a general purposed computer 150, such as a computer comprising a Pentium.RTM. II microprocessor, manufactured by Intel Corporation of Santa Clara, Calif., U.S.A., or the like, capable of operating at at least about 300 MHz. Moreover, computer 150 is preferably equipped with suitable software to create a coding environment fro accessing peripheral components. For example, suitable software includes LabVIEW.RTM.software, Part No. 776670-03, and the LabVIEW.RTM. PID Control Toolkit software, Part No. 7766634-11, which are commercially available from National Instruments, Inc., of Austin Tex., U.S.A.

Detailed Description Text - DETX (83):

Computer 150 is linked to a motor controller 151, e.g., an AT6200 Controller, manufactured by Parker Compumotor Company of Rohnert Park, Calif., U.S.A. Motor controller 151 relays instructions from computer 150 to a linear stepper motor 152a, e.g., a L20 Stepper Motor, manufactured by Parker

Compumotor Company of Rohnert Park, Calif., U.S.A., and a rotary stepper motor 152b, e.g., a **Zeta** 57-51-10 Motor and a **Zeta** 4 Rotary Driver manufactured by Parker Compumotor Company of Rohnert Park, Calif., U.S.A., via motor control 151.

Detailed Description Text - DETX (84):

In addition, computer 150 may be linked to a multi-function control 153, e.g., a DAQ Board Model No. AT-MIO-16DE, manufactured by National Instruments, Inc., of Austin, Tex., U.S.A. A micropositioner 155, e.g., a Low-Profile Three-Axis Micropositioner, Part No. CR 4000, manufactured by the Daedal Division of Parker Compumotor Company of Rohnert Park, Calif., U.S.A., may be operated directly to make positioning adjustments in a range of less than about 15 mm with an accuracy of about one micron, along cartesian axes in the position of a fluid dispenser outlet and a readout device. Multi-function control 153 provides operating instructions received from computer 150 to at least a fluid dispenser 154, e.g., a BioJet Quanti3000.TM. fluid dispenser, manufactured by BioDot, Inc. of Irvin, Calif., U.S.A., and a laser 156. Laser 156 delivers a beam of light to the surface of a substrate 10, via a first bandpass filter 157. Laser 156 and first bandpass filter 157 are selected according to the assay to be accomplished. Further, light reflected from the substrate's surface then may pass through a second bandpass filter 158 to a photomultiplier tube 159, e.g., a Hamamatsu PMT, Model No. 5784-01, manufactured by Hamamatsu **Corporation**, of Bridgewater, N.J., U.S.A.

Claims Text - CLTX (45):

32. The apparatus of claim 1, wherein said fluid dispenser ejects a micro-droplet stream of said fluid from said dispenser and an **electrostatic** accelerator and deflector directs said micro-droplet stream to at least one of said reaction sites.

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	0	zeta-rod and "zeta corporation"	USPAT; EPO; DERWENT	AND	ON	2006/05/19 11:58
L2	0	zeta-rod	USPAT; EPO; DERWENT	AND	ON	2006/05/19 11:59
L3	2512	zeta corporation	USPAT; EPO; DERWENT	AND	ON	2006/05/19 11:59
L4	38	3 and electrostatic generator	USPAT; EPO; DERWENT	AND	ON	2006/05/19 12:00
L5	15	4 and membrane	USPAT; EPO; DERWENT	AND	ON	2006/05/19 12:00
L6	0	5 and reverze osmosis	USPAT; EPO; DERWENT	AND	ON	2006/05/19 12:00
L7	2	5 and reverse osmosis	USPAT; EPO; DERWENT	AND	ON	2006/05/19 12:00

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L2: Entry 5 of 57

File: USPT

Jul 5, 2005

DOCUMENT-IDENTIFIER: US 6913382 B2

TITLE: Treatment of fluids

Brief Summary Text (3):

It is also known in the art to use electrostatic fields to treat the water such that particles in suspension become charged and can be attracted and/or repelled as desired. This principle is also used in processes such as paint spraying and photocopiers.

Brief Summary Text (4):

While the use of electrostatic fields has been known in the art, there has been minimal acceptance of the use of such devices. Furthermore, the use of such devices has been limited to very specific situations.

Brief Summary Text (13):

It is an object of the present invention to provide an apparatus which may be used to treat fluids with an electrostatic discharge.

Detailed Description Text (33):

A male beagle dog, prepared according to Example 6, was administered orally reverse osmosis water with stabilized dissolved oxygen at a dose concentration of 100 ppm and a dose volume of 250 ml. The results are given in Table 8 hereinbelow.

Detailed Description Text (35):

In this example, the male beagle dog was administered orally stabilized dissolved oxygen in a reverse osmosis water at a concentration of 100 ppm and a volume of 100 ml. The results are set forth in the Table 9 hereinbelow.

Detailed Description Text (37):

Human subjects were administered reverse osmosis water having a stabilized dissolved oxygen of 100 ppm. The blood oxygen level was then measured at varying time intervals. The results are set forth in FIGS. 4 to 10.

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L2: Entry 49 of 57

File: USPT

Aug 24, 1993

DOCUMENT-IDENTIFIER: US 5238613 A

TITLE: Microporous materials

Brief Summary Text (3):

The past 20 years has seen tremendous growth in the applications of polymeric membranes, not only in filtration--microfiltration (MF), ultrafiltration (UF), and hyperfiltration or reverse osmosis (RO)--but also in a variety of other areas such as fuel cells and batteries, controlled-release devices as for drug or herbicide metering, dialysis and electrodialysis, pervaporation, electrophoresis, membrane reactors, ion-selective electrodes, and as supports for liquid membranes, to name some important areas. Furthermore, modification of neutral polymer membranes can yield ionomeric or `ion-exchange` membranes which are finding increasing application in many chemical, electrochemical, filtration and even biochemical processes. In many applications the availability of a membrane with precisely-controlled porespace and high porosity would represent a significant technological advance.

Brief Summary Text (5):

The ultimate membrane would have identical, highly interconnected pores comprising a porespace with perfect three-dimensional periodic order. This ideal has been approached in the development of polymeric microporous membranes but never achieved. The simplest type of sieve is a net filter, where each layer in the filter is a woven mesh. The geometry of the pore space in a given layer is thus a close approximation to a finite portion of a doubly-periodic net, the latter being a mathematical idealization with perfect regularity within the plane. Note that if, in addition, these doubly-periodic layers are stacked at regular intervals with all layers in vertical registry, the resulting sieve is triply-periodic. Woven mesh filters are not available with pore sizes less than about 60 microns, so they cannot be used for reverse osmosis, ultrafiltration, nor even microfiltration.

Brief Summary Text (13):

In the realm of nonpolymeric sieves, zeolites provide fairly well-controlled, triply-periodic pore networks, but the free diameters of aperatures governing access to channels are generally less than 2 nm, and in fact nearly always less than 1 nm [Barrer 1978]; also the porosities of zeolites (defined as cc's of water per cc of crystal) are nearly always less than 50% Furthermore, most zeolites selectively absorb polar molecules because most are themselves highly polar, having high local electrostatic fields and field gradients [Barrer 1978]. Perhaps most importantly, the macroscopic size of zeolite crystals has very serious practical limitations making such materials unsuitable for forming reasonably large membrane-like structures with the necessary degree of continuity.

Detailed Description Text (54):

On the other hand, in this method, as in some of the variations of type 1) processes discussed above, the polymerization reaction(s) can be carried out before the formation of the triply-periodic phase. The study of the morphologies of phase-segregated block copolymers is quite young and has not received a great deal of attention. Therefore very little is known about the occurance of bicontinuous cubic phases in block copolymers. Generally speaking, however, the situation is in many ways simpler than in surfactant systems where electrostatic interactions between

surfactant head groups play a dominant role in determining microstructure. In diblock copolymers, on the other hand, the morphology is essentially determined by the immiscibility of the two covalently bonded blocks, so that two diblock copolymers, with the same volume ratio between the two blocks, should to first order be expected to exhibit the same morphology. To a large extent this has been borne out by the diblock and star-block copolymers whose phase behavior has been studied; at nearly 50:50 volume fraction ratios between the two blocks, lamellae generally are present; at high volume fraction ratios, approximately 80:20 or higher, spheres are present; and in between one finds cylindrical morphologies or bicontinuous cubic morphologies, the latter generally restricted to a narrow range near 30:70. This is also the situation predicted by simple [Inoue et al. 1968] and more sophisticated theories Leibler 1980: Ohta and Kawasaki 1986], except that these theories were developed before the discovery of bicontinuous block copolymer morphologies and so did not include these possibilities. Thus, the proof of the existence of bicontinuous cubic phases in star-block [Thomas et al. 1986] and in linear diblock [Hasegawa 1987] copolymers indicates that these phases will be found in a variety of copolymers as studies of morphology continue, now that the identity of the phase has been established.

Detailed Description Text (86):

As previously mentioned, the past 20 years has seen tremendous growth in the applications of polymeric membranes, not only in filtration--microfiltration (MF), ultrafiltration (UF), and hyperfiltration or reverse osmosis (RO)--but also in a variety of other areas such as fuel cells and batteries, controlled-release devices as for drug or herbicide metering, dialysis and electrodialysis, pervaporation, electrophoresis, membrane reactors, ion-selective electrodes, and as supports for liquid membranes, to name some important areas. Furthermore, modification of neutral polymer membranes can yield ionomeric or `ion-exchange` membranes which are finding increasing application in many chemical, electrochemical, filtration and even biochemical processes. In many applications the availability of a membrane of the type described herein with precisely-controlled porespace and high porosity represents a significant technological advance.

Detailed Description Text (87):

Traditionally membranes have been associated with filtration processes for purification or concentration of fluids, or recovery of particles as in the recovery of colloidal paint particles from spent electrolytic paint particle suspensions, and the very important application of recovering of lactose-free protein from whey. The use of reverse osmosis and electrodialysis in removing trace pollutants from industrial waste streams is increasing each year, as the cost of these processes is often less than other alternatives [Spatz 1981]; because these processes are being applied for waste treatment in agricultural, chemical, biochemical, eletrochemical, food, pharmaceutical, petrochemical, and pulp and paper industries, the development of this technology will have a significant impact on the environment.

Detailed Description Text (89):

Reverse osmosis is finding new applications every year. RO and UF are being investigated [Drioli et al. 1981] for the treatment of must and wines without the addition of sulfur dioxide, which is routinely added to remove certain enzymes that would otherwise cause an oxidized taste. The concentration of tomato juice by RO has been applied on a semicommercial scale, and results in enhanced taste and color over conventional processes [Ishii et al. 1981]. A recent study [Farnand et al. 1981] has shown that RO can also be used to separate inorganic salts from nonaqueous solvents such as methanol; the latter solvent is of particular importance in that methanol is being investigated as an alternative fuel.

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L2: Entry 57 of 57

File: USPT

Dec 4, 1979

DOCUMENT-IDENTIFIER: US 4177228 A

TITLE: Method of production of a micro-porous membrane for filtration plants

Brief Summary Text (2):

The present invention relates to a method for producing a micro-porous diaphragm or membrane for filtration plants, whereby finely distributed, insoluble particles are mixed and aligned in a plastics material or previously produced or primary plastics material product and are dissolved out on the final position. Such diaphragms or membranes are suitable for ultra filtration of aqueous media, for reverse osmosis and dialysis.

Brief Summary Text (3):

There is generally understood by the term "ultra filtration" the separation of colloidal particles with moderate excess pressure, whilst by reverse osmosis there is understood the separation of substantially smaller, truly dissolved particles at high pressure from the solvent or increasing the concentration of dissolved particles in a solvent.

Detailed Description Text (21):

(d) Electrostatic field lines layer

CLAIMS:

4. The method of claim 1 wherein said particles are electrically charged and the alignment of the particles is effected by subjecting the charged particle containing polymer layer to an electrostatic field.

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☐ 1. Document ID: US 7015254 B2

L3: Entry 1 of 1

File: USPT

Mar 21, 2006

US-PAT-NO: 7015254

DOCUMENT-IDENTIFIER: US 7015254 B2

TITLE: Description of an inorganic polymer "electret "in a colloidal state along with the method of generating and applications

DATE-ISSUED: March 21, 2006

PRIOR-PUBLICATION:

DOC-ID

DATE

US 20010027219 A1

October 4, 2001

INVENTOR-INFORMATION:

NAME

CITY

STATE

ZIP CODE

COUNTRY

Holcomb; Robert R.

Nashville

TN

37212

US

US-CL-CURRENT: [516/82](#); [252/179](#), [252/184](#), [264/436](#), [307/400](#), [516/100](#), [516/83](#)

Full	Title	Citation	Front	Review	Classification	Date	Reference	Search	File	Claims	MM	Draw
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☐ 1. Document ID: US 6773600 B2

L7: Entry 1 of 16

File: USPT

Aug 10, 2004

US-PAT-NO: 6773600

DOCUMENT-IDENTIFIER: US 6773600 B2

TITLE: Use of a clathrate modifier, to promote passage of proteins during nanofiltration

DATE-ISSUED: August 10, 2004

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Rosenblatt; Barry P.	Morrisville	PA		
Siegel; Richard C.	Chester Springs	PA		

US-CL-CURRENT: [210/639](#); [210/644](#), [210/651](#), [210/739](#), [210/743](#), [210/749](#), [424/176.1](#), [436/177](#), [436/178](#), [530/414](#)

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWC	Draw D
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☐ 2. Document ID: US 6416668 B1

L7: Entry 2 of 16

File: USPT

Jul 9, 2002

US-PAT-NO: 6416668

DOCUMENT-IDENTIFIER: US 6416668 B1

TITLE: Water treatment process for membranes

DATE-ISSUED: July 9, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Al-Samadi; Riad A.	Burlington, Ontario			CA

US-CL-CURRENT: [210/636](#); [210/639](#), [210/641](#), [210/651](#), [210/721](#), [210/722](#), [210/724](#), [210/760](#), [210/806](#)

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWC	Draw D
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☐ 3. Document ID: US 6355175 B1

L7: Entry 3 of 16

File: USPT

Mar 12, 2002

US-PAT-NO: 6355175

DOCUMENT-IDENTIFIER: US 6355175 B1

**** See image for Certificate of Correction ****

TITLE: Method for separating and isolating precious metals from non precious metals dissolved in solutions

DATE-ISSUED: March 12, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Green; Dennis H.	Arvada	CO		
Mueller; Jeff	Boulder	CO		
Lombardi; John A.	Boulder	CO		

US-CL-CURRENT: 210/652; 210/639, 210/651, 423/29, 75/744

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KMOC	Draw D
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☐ 4. Document ID: US 5846428 A

L7: Entry 4 of 16

File: USPT

Dec 8, 1998

US-PAT-NO: 5846428

DOCUMENT-IDENTIFIER: US 5846428 A

TITLE: Method for modifying the surface of a polymer membrane, and a membrane thus modified

DATE-ISSUED: December 8, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Martin; Didier	Givry			FR
Poncelet; Olivier Jean-Christian	Chalon S/Saone			FR
Rigola; Jeanine	Chalon S/Saone			FR

US-CL-CURRENT: 210/651; 210/490, 210/500.25, 210/500.26, 210/500.29, 210/500.41, 210/653, 427/165, 427/244, 427/343

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KMOC	Draw D
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☐ 5. Document ID: US 5788862 A

L7: Entry 5 of 16

File: USPT

Aug 4, 1998

US-PAT-NO: 5788862
DOCUMENT-IDENTIFIER: US 5788862 A

TITLE: Filtration medium

DATE-ISSUED: August 4, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Degen; Peter J.	Huntington	NY		
Bilich; Moira H.	Massapequa	NY		
Staff; Trevor A.	Bronx	NY		
Gerringer; John	Port Washington	NY		
Salinaro; Richard Frank	Hastings on Hudson	NY		

US-CL-CURRENT: 210/651; 210/490, 210/500.35, 210/500.36, 210/500.38, 210/500.41,
264/4, 264/49

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	K/MC	Draw. D.
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☐ 6. Document ID: US 5685991 A

L7: Entry 6 of 16

File: USPT

Nov 11, 1997

US-PAT-NO: 5685991
DOCUMENT-IDENTIFIER: US 5685991 A

TITLE: Integrity-testable wet-dry-reversible ultrafiltration membranes and method
for testing same

DATE-ISSUED: November 11, 1997

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Degen; Peter J.	Huntington	NY		
Mischenko, III; John	Amityville	NY		
Kesting; Robert E.	Sumner	WA		
Bilich; Moira H.	Massapequa	NY		
Staff; Trevor A.	Bronx	NY		

US-CL-CURRENT: 210/651; 210/500.41, 210/645, 264/41

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	K/MC	Draw. D.
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☐ 7. Document ID: US 5569384 A

L7: Entry 7 of 16

File: USPT

Oct 29, 1996

US-PAT-NO: 5569384
DOCUMENT-IDENTIFIER: US 5569384 A

**** See image for Certificate of Correction ****

TITLE: Process for recovering the overspray of aqueous coating agents during spray application in spray booths

DATE-ISSUED: October 29, 1996

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Saatweber; Dietrich	Wuppertal			DE
Siever; Friedrich L.	Schwelm			DE

US-CL-CURRENT: 210/651; 210/195.2

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC	Draw D
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☐ 8. Document ID: US 5480554 A

L7: Entry 8 of 16

File: USPT

Jan 2, 1996

US-PAT-NO: 5480554

DOCUMENT-IDENTIFIER: US 5480554 A

TITLE: Integrity-testable wet-dry-reversible ultrafiltration membranes and method for testing same

DATE-ISSUED: January 2, 1996

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Degen; Peter J.	Huntington	NY		
Mischenko, III; John	Amityville	NY		
Kesting; Robert E.	Sumner	WA		
Bilich; Moira H.	Massapequa	NY		
Staff; Trevor A.	Bronx	NY		

US-CL-CURRENT: 210/651; 210/500.41

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC	Draw D
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☐ 9. Document ID: US 5439592 A

L7: Entry 9 of 16

File: USPT

Aug 8, 1995

US-PAT-NO: 5439592

DOCUMENT-IDENTIFIER: US 5439592 A

TITLE: Method for removal of water soluble organics from oil process water

DATE-ISSUED: August 8, 1995

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Bellos; Thomas J.	St. Louis	MO		
Keating; Richard D.	Bridgeton	MO		

US-CL-CURRENT: [210/651](#); [210/639](#), [210/650](#), [210/652](#), [210/724](#), [210/799](#), [210/805](#),
[210/908](#), [210/96.1](#)

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequence	Alignments	Claims	KWIC	Draw D
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☐ 10. Document ID: US 5304307 A

L7: Entry 10 of 16

File: USPT

Apr 19, 1994

US-PAT-NO: 5304307

DOCUMENT-IDENTIFIER: US 5304307 A

TITLE: Charged asymmetric mosaic membranes

DATE-ISSUED: April 19, 1994

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Linder; Charles	Rehovot			IL
Nemas; Mara	Neve Monoson			IL
Perry; Mordechai	Petach Tikva			IL
Ketraro; Reuven	Rishon Letzion			IL

US-CL-CURRENT: [210/490](#); [210/500.27](#), [210/500.29](#), [210/500.34](#), [210/500.37](#), [210/500.38](#),
[210/500.39](#), [210/500.4](#), [210/500.41](#), [210/500.43](#), [210/651](#)

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequence	Alignments	Claims	KWIC	Draw D
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☐ 1. Document ID: US 6773600 B2

L7: Entry 1 of 16

File: USPT

Aug 10, 2004

US-PAT-NO: 6773600

DOCUMENT-IDENTIFIER: US 6773600 B2

TITLE: Use of a clathrate modifier, to promote passage of proteins during nanofiltration

DATE-ISSUED: August 10, 2004

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Rosenblatt; Barry P.	Morrisville	PA		
Siegel; Richard C.	Chester Springs	PA		

US-CL-CURRENT: [210/639](#); [210/644](#), [210/651](#), [210/739](#), [210/743](#), [210/749](#), [424/176.1](#), [436/177](#), [436/178](#), [530/414](#)

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC	Draw Data
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☐ 2. Document ID: US 6416668 B1

L7: Entry 2 of 16

File: USPT

Jul 9, 2002

US-PAT-NO: 6416668

DOCUMENT-IDENTIFIER: US 6416668 B1

TITLE: Water treatment process for membranes

DATE-ISSUED: July 9, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Al-Samadi; Riad A.	Burlington, Ontario			CA

US-CL-CURRENT: [210/636](#); [210/639](#), [210/641](#), [210/651](#), [210/721](#), [210/722](#), [210/724](#), [210/760](#), [210/806](#)

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC	Draw Data
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☐ 3. Document ID: US 6355175 B1

L7: Entry 3 of 16

File: USPT

Mar 12, 2002

US-PAT-NO: 6355175

DOCUMENT-IDENTIFIER: US 6355175 B1

**** See image for Certificate of Correction ****

TITLE: Method for separating and isolating precious metals from non precious metals dissolved in solutions

DATE-ISSUED: March 12, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Green; Dennis H.	Arvada	CO		
Mueller; Jeff	Boulder	CO		
Lombardi; John A.	Boulder	CO		

US-CL-CURRENT: 210/652; 210/639, 210/651, 423/29, 75/744

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC	Draw D
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☐ 4. Document ID: US 5846428 A

L7: Entry 4 of 16

File: USPT

Dec 8, 1998

US-PAT-NO: 5846428

DOCUMENT-IDENTIFIER: US 5846428 A

TITLE: Method for modifying the surface of a polymer membrane, and a membrane thus modified

DATE-ISSUED: December 8, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Martin; Didier	Givry			FR
Poncelet; Olivier Jean-Christian	Chalon S/Saone			FR
Rigola; Jeanine	Chalon S/Saone			FR

US-CL-CURRENT: 210/651; 210/490, 210/500.25, 210/500.26, 210/500.29, 210/500.41, 210/653, 427/165, 427/244, 427/343

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC	Draw D
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☐ 5. Document ID: US 5788862 A

L7: Entry 5 of 16

File: USPT

Aug 4, 1998

US-PAT-NO: 5788862

DOCUMENT-IDENTIFIER: US 5788862 A

TITLE: Filtration medium

DATE-ISSUED: August 4, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Degen; Peter J.	Huntington	NY		
Bilich; Moira H.	Massapequa	NY		
Staff; Trevor A.	Bronx	NY		
Gerringer; John	Port Washington	NY		
Salinaro; Richard Frank	Hastings on Hudson	NY		

US-CL-CURRENT: 210/651; 210/490, 210/500.35, 210/500.36, 210/500.38, 210/500.41,
264/4, 264/49

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC	Draw. D
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☐ 6. Document ID: US 5685991 A

L7: Entry 6 of 16

File: USPT

Nov 11, 1997

US-PAT-NO: 5685991

DOCUMENT-IDENTIFIER: US 5685991 A

TITLE: Integrity-testable wet-dry-reversible ultrafiltration membranes and method
for testing same

DATE-ISSUED: November 11, 1997

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Degen; Peter J.	Huntington	NY		
Mischenko, III; John	Amityville	NY		
Kesting; Robert E.	Sumner	WA		
Bilich; Moira H.	Massapequa	NY		
Staff; Trevor A.	Bronx	NY		

US-CL-CURRENT: 210/651; 210/500.41, 210/645, 264/41

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC	Draw. D
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☐ 7. Document ID: US 5569384 A

L7: Entry 7 of 16

File: USPT

Oct 29, 1996

US-PAT-NO: 5569384

DOCUMENT-IDENTIFIER: US 5569384 A

**** See image for Certificate of Correction ****

TITLE: Process for recovering the overspray of aqueous coating agents during spray application in spray booths

DATE-ISSUED: October 29, 1996

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Saatweber; Dietrich	Wuppertal			DE
Siever; Friedrich L.	Schwelm			DE

US-CL-CURRENT: 210/651; 210/195.2

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWMC	Draw. D
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☐ 8. Document ID: US 5480554 A

L7: Entry 8 of 16

File: USPT

Jan 2, 1996

US-PAT-NO: 5480554

DOCUMENT-IDENTIFIER: US 5480554 A

TITLE: Integrity-testable wet-dry-reversible ultrafiltration membranes and method for testing same

DATE-ISSUED: January 2, 1996

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Degen; Peter J.	Huntington	NY		
Mischenko, III; John	Amityville	NY		
Kesting; Robert E.	Sumner	WA		
Bilich; Moira H.	Massapequa	NY		
Staff; Trevor A.	Bronx	NY		

US-CL-CURRENT: 210/651; 210/500.41

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWMC	Draw. D
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☐ 9. Document ID: US 5439592 A

L7: Entry 9 of 16

File: USPT

Aug 8, 1995

US-PAT-NO: 5439592

DOCUMENT-IDENTIFIER: US 5439592 A

TITLE: Method for removal of water soluble organics from oil process water

DATE-ISSUED: August 8, 1995

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Bellos; Thomas J.	St. Louis	MO		
Keating; Richard D.	Bridgeton	MO		

US-CL-CURRENT: 210/651; 210/639, 210/650, 210/652, 210/724, 210/799, 210/805,
210/908, 210/96.1

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequence	Attachments	Claims	KWIC	Draw D
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☐ 10. Document ID: US 5304307 A

L7: Entry 10 of 16

File: USPT

Apr 19, 1994

US-PAT-NO: 5304307

DOCUMENT-IDENTIFIER: US 5304307 A

TITLE: Charged asymmetric mosaic membranes

DATE-ISSUED: April 19, 1994

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Linder; Charles	Rehovot			IL
Nemas; Mara	Neve Monoson			IL
Perry; Mordechai	Petach Tikva			IL
Ketraro; Reuven	Rishon Letzion			IL

US-CL-CURRENT: 210/490; 210/500.27, 210/500.29, 210/500.34, 210/500.37, 210/500.38,
210/500.39, 210/500.4, 210/500.41, 210/500.43, 210/651

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequence	Attachments	Claims	KWIC	Draw D
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